THE

ONTARIO WATER RESOURCES

COMMISSION

WATER POLLUTION SURVEY

of the

VILLAGE OF BELLE RIVER

COUNTY OF ESSEX

1967 & 1968

REPORT

ON A

WATER POLLUTION SURVEY

OF THE

VILLAGE OF BELLE RIVER

COUNTY OF ESSEX

MAY 1967

APRIL 1968

DISTRICT ENGINEER'S BRANCH

DIVISION OF SANITARY ENGINEERING

ONTARIO WATER RESOURCES COMMISSION

REPORT

INTRODUCTION

A water pollution survey of surface water drains, storm sewers, and municipal drains within the Village of Belle River, was conducted in May 1967 and April 1968.

Mr. J.H. Chaseley, Clerk-Treasurer, Village of Belle River, provided information pertinent to the survey. Mr. A. Denomey, Road Superintendent, assisted with the investigation and sampling programme.

GENERAL

The Village of Belle River with an assessed population of 2,337 (1968 Municipal Directory) is located on the Belle River in the north-central portion of the County of Essex.

In general, drainage water from the area west of Seventh Street discharges into the Belle River. The drainage water from the area east of Seventh Street discharges into Duck Creek. Local drainage is provided by municipal drains, storm sewers, and private drains, all of which flow into either the Belle River or Duck Creek. These streams in turn flow north to Lake St.Clair.

The water pollution survey, as conducted, consisted of locating and sampling municipal surface water drains and storm sewers to determine the level of pollution being discharged into the watercourses from the village area.

At the time of the survey the water level in the Belle River was 15 to 18 inches above normal. Consequently all surface water sewers to the river were submerged at their outfalls. An abnormally high water level was also noted in several manholes indicating a back-up of river water into the storm sewers. Samples were therefore collected from these surface water drains as close as possible to the river. Samples of surface water drains to Duck Creek were obtained near their outfalls to the creek.

WATER SUPPLY

The potable water supply for the Village of Belle River is obtained from Lake St.Clair and receives pre-chlorination, coagulation, settling, filtering and post-chlorination treatment prior to distribution to its consumers.

WASTE DISPOSAL

Municipal

Septic tank systems are utilized on most properties for the treatment of domestic sanitary sewage. Heavy clay soil conditions, combined with a high water table, tend to result in unsatisfactory operation of field tile disposal beds in many instances. The lack of space for the installation of adequate field tile beds is evident on many residential and commercial properties. These conditions have resulted in the practice of discharging inadequately treated septic tank effluent into surface water drains.

A discussion with the Metro Windsor-Essex County Health Unit confirmed our findings of poorly operating field tile disposal systems.

The Village of Belle River has requested the OWRC to construct a provincially-owned sewerage works and this municipal project is in the preliminary stages of development.

Refuse Disposal

The Village of Belle River and the Township of Rochester use a common landfill operation located in Lot 3, Concession 1, of the Township of Rochester. There was no indication of surface water run-off or drainage to local watercourses from the disposal site at the time of the surveys. The site location is shown on the accompanying map of the village.

WATER POLLUTION

Surface Water Drainage Quality

A total of 14 municipal surface water drains or storm sewers were examined for water quality. Of this total, 11 drains flowed to the Belle River and 3 drains flowed to Duck Creek.

A perusal of these results indicated that all 14 sampling points had high concentrations of biochemical oxygen demand or suspended solids. Eleven of the 14 sampling points had coliform organism counts above OWRC objectives of 2,400 coliforms per 100 ml of sample.

Anionic detergent concentrations (as ABS) were found in all the samples collected during both surveys.

The overall results of the chemical analyses and bacteriological examination results of both sampling programmes indicated an almost equal degree of degraded surface water quality confirming the continuing pollution problem in this municipality.

Watercourse Quality

Sanitary chemical results of samples collected from the Belle River during the April 1968 survey showed an increase from 11,000 to 129,000 coliform organisms per 100 ml of sample as the watercourse flowed through the municipality.

The land in the immediate area of Duck Creek is predominately used for agricultural purposes. At the time of the inspections unsatisfactory wastes did not appear to be entering Duck Creek from the small number of cottages located adjacent to the Creek near Lake St.Clair.

SUMMARY

Based on the observations and findings of this survey it is evident that domestic wastes and sanitary sewage are gaining access to municipal surface water drains, which in turn results in pollution of the Belle River.

Since this contamination is extensive and since soil conditions in many parts of the Village of Belle River are such that septic tank field tile disposal systems do not operate effectively, the pollution problem can best be solved on a municipal level in the form of a communal sewage collection and treatment works.

RECOMMENDATIONS

While it is noted that the municipality of Belle River is progressing towards providing a sewage collection and treatment system, it is recommended that these facilities be installed at the earliest possible date.

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Prepared by W. L. Talbot

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Division of Sanitary Engineering.

TABLE I

VILLAGE OF BELLE RIVER - WATER POLLUTION SURVEY

SURFACE WATER DRAINS AND STORM SEWERS

Location of Sampling Points	Description of Sampling Points	Date Sampled	5-Day BOD (ppm)	SOLIDS (ppm) Total	Susp.	Diss.	Anionic Detergent as ABS (ppm)	Coliforms per 100 ml Membrane Filter
DRAINS TO BELLE RIVER								
P-4W	First St. at CNR Tracks	April 1968	NO FLOW					
		May 1967	47.0	532	36	496	12.0	16,000,000
P-5W	First St. at Broadway St.	April 1968	10.0	610	16	594	1.2	164,000
		May 1967	10.0	368	158	210	1.3	164,000
P-6W	Charles at Front St.	April 1968	64.0	606	56	550	19.2	128,000,000
		May 1967	67.0	530	90	440	13.0	74,000,000
P-7W	Notre Dame St. at Front St.	April 1968	175.0	1822	598	1224	44.0	41,000,000
		May 1967	8.0	282	10	272	1.5	66,000,000
P-8W	St.Peter St. at Lalonde Ave.	April 1968	52.0	548	32	516	10.5	8,000,000
		May 1967	12.0	490	22	468	1.7	60,000,000
P-9W	Lalonde Ave. at Henery St.	April 1968	61.0	704	30	674	13.2	2,100,000
		May 1967	46.0	658	40	618	18.	5,100,000
P-10W	West River Rd. at St.Clair St.	April 1968	24.0	794	24	774	3.2	810,000
		May 1967	57.0	658	110	548	12.	2,900,000
P-11D	Open Drain-north side of CNR Tracks	April 1968	-	-	-	-	-	-
		May 1967	5.0	364	52	312	0.2	6,000
P-12D	Open Drain-south side of CNR Tracks	April 1968	5.3	524	16	508	0.5	80,000
		May 1967	4.0	310	34	276	0.1	10,000

Location of Sampling Points	Description of Sampling Points	Date Sampled	5-Day BOD (ppm)	SOLIDS (ppm) Total	Susp.	Diss.	Anionic Detergent as ABS (ppm)	Coliforms per 100 ml Membrane Filter
P-13W	Notre Dame St. at Fourth St.	April 1968	30.0	948	68	880	9.8	6,900,000
		May 1967	26.0	580	190	390	2.6	6,860,000
P-18W	Ninth St. at Charles St.	April 1968	19.0	1090	226	864	0.7	2,400,000
		May 1967	-	-	-	-	-	-
DRAINS TO DUCK CREEK								
P-1W	South East Corner of Bridge on Hwy #39	April 1968	3.5	968	50	918	0.3	80
		May 1967	55	938	114	824	4.4	6,000,000
P-2W	North East Corner of Bridge on Hwy #39	April 1968	2.8	582	34	548	0.2	680
		May 1967	7	580	34	546	0.5	540
P-3W	North West Corner of Bridge on Hwy #39	April 1968	3.2	486	22	464	0.1	520
		May 1967	14	800	10	790	3.0	1,100

TABLE II

VILLAGE OF BELLE RIVER - WATER POLLUTION SURVEY

WATERCOURSE QUALITY

Location of Sampling Points	Description of Sampling Points	Date Sampled	5-Day BOD (ppm)	SOLIDS (ppm)			Anionic Detergent as ABS(ppm)	Coliforms per 100 ml Membrane Filter
				Total	Susp.	Diss.		
P-14	Belle River at CNR Tracks	April 1968	4.0	476	56	420	0.2	129,000
		May 1967	5.0	382	26	356	0.1	54,000
P-15	Belle River at CPR Tracks	April 1968	2.7	494	36	458	0.2	11,000
		May 1967	9.0	538	34	504	0.1	10,000
P-16	Duck Creek at Hwy. #39	April 1968	6.8	796	37	757	0.2	630
		May 1967	6.0	548	46	562	0.1	330
P-17	Duck Creek at CNR Tracks	April 1968	4.2	566	80	486	0.1	44,000
		May 1967	5.0	516	51	465	0.1	6,000

APPENDIX

SIGNIFICANCE OF LABORATORY ANALYSES

BACTERIOLOGICAL EXAMINATION

The presence of coliforms indicates pollution from human or animal excrement, or from some non-faecal forms. The objective for surface water quality in Ontario is maximum of 2400 organisms per 100 millilitres.

The OWRC Laboratories employ the Membrane Filter (MF) technique of examination to obtain a direct enumeration of coliform organisms.

SANITARY CHEMICAL ANALYSES

Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand is reported in parts per million (ppm) and is an indication of the amount of oxygen required for the stabilization of decomposable organic or chemical matter in water. The completion of the laboratory test required five days, under the controlled incubation temperature of 20° Centigrade.

The OWRC objective for surface water quality is an upper limit of four (4) ppm.

Solids

The value for solids, expressed in parts per million (ppm) is the sum of the values for the suspended and the dissolved matter in the water. The concentration of suspended solids is generally the most significant of the solids analyses with regard to surface water quality.

The effects of suspended solids in water are reflected in difficulties associated with water purification, depositions in streams and injury to the habitat of fish. Where suspended solids values are less than 20 ppm, laboratory difficulties are experienced and the turbidity is determined instead.

Turbidity

Turbidity is caused by the presence of suspended matter, such as clay, silt, finely divided organic matter, plankton and other microscopic organisms in water. It is an expression of the optical property of a sample and the results are reported in "Turbidity units".

PHYSICAL DETERMINATIONS

Dissolved Oxygen

The amount of dissolved oxygen contained in unpolluted water fluctuates with the temperature. A deficiency of oxygen in water is replaced by oxygen from the atmosphere. There is a saturation value for each temperature. At 18^{o} C this is 9.54 ppm of dissolved oxygen. Values below the saturation level indicate the presence of polluting organic substances which are absorbing oxygen from the water. The extent of this deficiency is one index of the degree of organic pollution. Substantial reduction in dissolved oxygen causes suffocation of fish.

Temperature

The temperature of water influences the solubility of oxygen and the rate of oxidation and purification.

Anionic Detergent (ABS)

The presence of anionic detergent generally indicates pollution from domestic sources.

Abbreviations and Symbols

Engineering Terms

ABS - Alkyl benzene sulfonate
BOD - Biochemical oxygen demand
gpd - Gallons per day
mgd - Million gallons per day
ppm - parts per million
ppb - parts per billion
ml - millilitre
MF - Membrane filter

Miscellaneous

Diss. - Dissolved
No. - Number
Susp. - Suspended

APPENDIX

COMMUNITY PLANNING

The need for effective planning has become more important today than every before. Municipalities are being burdened with the rising costs of land and labour. Therefore, any project a community hopes to develop should be based on sound planning. Planning at all levels of government is essential but, community planning can be most effective if interest and initiative is generated at the local level. The enormous benefits accrued as a result of good planning can more than compensate for the initial investment.

Community planning can be described as an effort to control and direct development effectively. This can best be achieved through the development of an official plan. An official plan is the stated intention of the local authorities with respect to orderly development within the planning area, that is prepared and set forth with professional assistance and meets the requirements as set out by the Provincial Planning Act. An official plan can be a joint effort by a number of municipalities which have common basic characteristics and common problems, or one municipality can establish a plan on its own initiative.

Orderly development yields future economy in services. Development in the community can be retarded where an official plan does not exist. A plan provides, among other things, the framework for the rational design of water and sewage works and also the extensions of mains and collector sewer systems.

A local council having decided to proceed with a programme of community planning definitely should contact the Ontario Department of Municipal Affairs. Through its many branches, information and guidance is provided to all interested parties.

LAKE ST. CLAIR

WATER WORKS ELEVATED STORAGE TANK

BELLE RIVER WATER WORKS

LAKEVIEW DR.

P-17

P-5 W | P-10 W | P-12 D | P-11 D | P-14 | P-4 W

CANADIAN NATIONAL RAILWAY

CAILLE AVE.

ST. CLAIR ST.

TOWNSHIP OF ROCHESTER

RAILWAY AVE.

TECUMSEH ROAD

FIRST ST. | SECOND ST. | THIRD ST. | FOURTH ST. | FIFTH ST. | SIXTH ST. | SEVENTH ST. | EIGHTH ST. | NINTH ST. | TENTH ST. | ELEVENTH ST.

BROADWAY

DUCHARME ST

THE KING'S HIGHWAY Nº 39 (TECUMSEH ROAD)

KING'S HIGHWAY NO. 39

NOTRE DAME ST.

CHARLES ST

P-18 W

P-3 D | P-2 D | P-1 D | P-16

BELLE RIVER CANNING CO.

P-13 W

GORE ST. | QUELLETTE ST. | FRONT ST. | EAST RIVER ST.

ST. PETER ST.

VILLAGE LIMITS

P-7 W | P-6 W | P-8 W

LALONDE AVE.

PUBLIC SCHOOL

SEPARATE SCHOOL

MUNICIPAL OFFICES

WEST BELLE RIVER ST.

SOUTH ST.

HENRY AVE.

NORTH ESSEX HIGH SCHOOL

P-9 W

VILLAGE LIMITS

LALONDE

P-15

ROURKE LINE ROAD

NORTH BRANCH OF BROWNS CREEK DRAIN

DUCK CREEK

TOWNSHIP OF ROCHESTER AND VILLAGE OF BELLE RIVER REFUSE DISPOSAL AREA

CANADIAN PACIFIC RAILWAY

BELLE RIVER

EAST BELLE RIVER ROAD

TOWNSHIP OF MAIDSTONE

TOWNSHIP OF ROCHESTER

LEGEND

P-12 — SAMPLING POINT SHOWING STREAM AND SAMPLE NUMBER

P-10 W — STREAM AND SAMPLE AT OUTFALL
— TYPE OF OUTFALL

OUTFALL SYMBOL LETTERS

W — STORM SEWER
D — DITCH

ONTARIO WATER RESOURCES COMMISSION

VILLAGE OF BELLE RIVER

WATER POLLUTION SURVEY 1968

SCALE: 100 0 200 400 600 800 1000 FEET

DRAWN BY: A.R.S. | DATE: AUG., 1967

CHECKED BY: | DRAWING Nº: 67-67